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Can perceived safety measure road safety infrastructure changes? Evidence from school-zone interventions in Lusaka, Zambia

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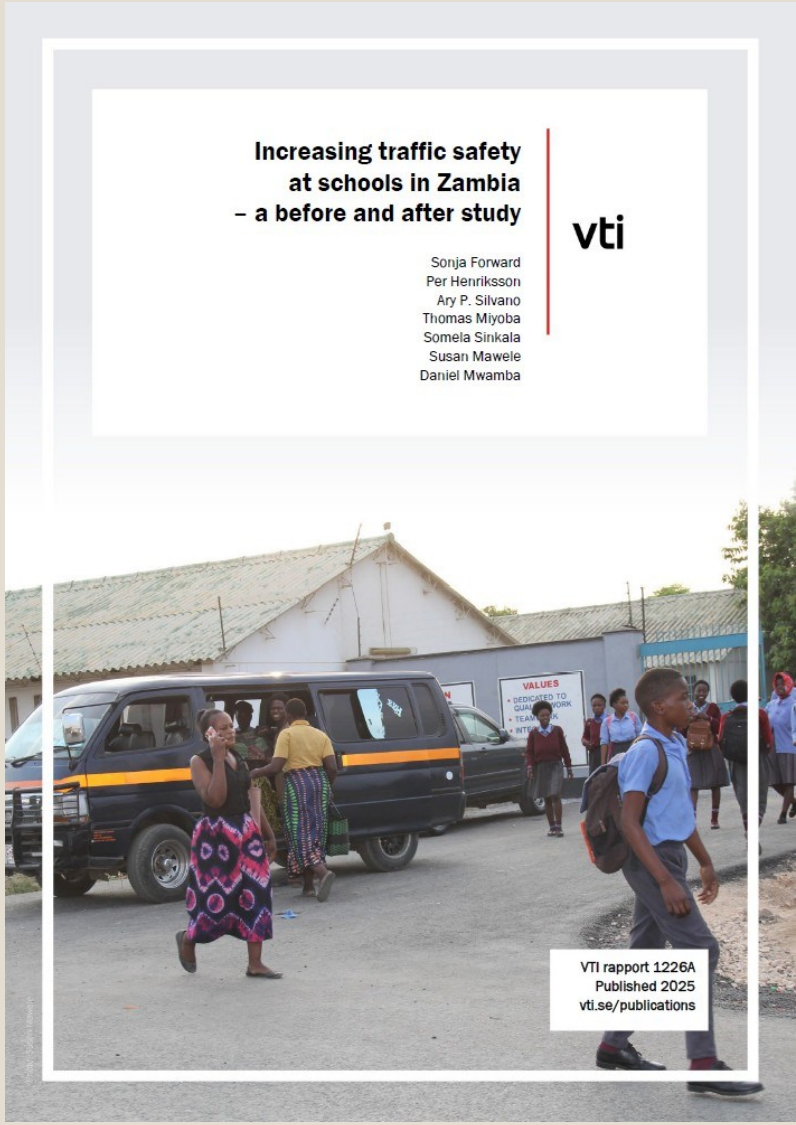
Background

Pilot study: infrastructure changes at school zones

Self-reported perception data (survey) – 3 groups

Analyzed using **descriptive analyses** and vehicle speed measurements.



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Objective

Aim

- Quantify the effect of school-zone interventions on perceived safety.
- Assess whether perception survey data can be used as a safety indicator in LMIC school environments.

Before – After study

- **Treatment Schools**
  - Kizito
  - Daina Kaimba
- **Control School**
  - Woodlands B

Survey data

- 299 pupils (155 boys and 142 girls)
- Aged 8 – 12 years-old (mean age: 10.6)

School	Responses Before	Responses After	Total school
Kizito	51	46	97
Daina Kaimba	50	49	99
Woodlands B	49	54	103
Total period	150	149	299

Implemented infrastructure improvements

School	Road signs	Bollards	Sidewalks	Zebra crossings near School entrance	Speed Humps
Kizito	Yes	Yes	Yes	Yes	Yes
Daina Kaimba	Yes	Yes	Yes	*No*	*No*

The Kizito Primary School: before and after

The new road signs informed that the driver was entering a school zone and speed limitation was 30 km/h (from 40 km/h).

The Kizito Primary School

The Daina Kaimba School: before and after

The new road signs informed that the driver was entering a school zone and speed limitation was 30 km/h (from 40 km/h).

Woodland's primary school – Control school

Three safety perception items

1. How safe do you feel when crossing?
2. How easy is it to cross the road?
3. How afraid are you of being hit by a vehicle?

5-point Likert scale

1: very safe to 5: very unsafe

Analysis

- Linear regressions on first item (how safe?)
  - Fixed-effect
  - Difference-in-Differences
  - Ordered logit
- Non-parametric tests
- Factor Analysis (FA)
  - One-factor composite score based on the three perceived safety items

FA Results

One-factor score based on 3-items for perceived safety survey data

Item	Factor loadings	Communalities
How safe when crossing	0.819	0.671
Easy of crossing	0.810	0.656
Fear of accident	0.505	0.255

Cronbach's alpha = 0.746

Regression with one-factor composite score (DiD)

	Coeff. (β)	Std err	t	P > | t |	[0.025	0.095]
Intercept	-0.59	0.321	-1.844	0.067	-1.224	0.041
School 2 (Daina)	0.31	0.135	2.275	0.024	0.041	0.575
School 3 (Woodlands)	-1.14	0.212	-5.364	0.000	-1.556	-0.720
Treatment	0.55	0.252	2.173	0.031	0.051	1.042
Period	0.81	0.164	4.948	0.000	0.487	1.132
Interaction Treat*Period	-1.53	0.217	-7.028	0.000	-1.954	-1.098
Gender	0.24	0.101	2.412	0.017	0.045	0.443
Age	0.06	0.041	1.574	0.117	-0.016	0.144

Main findings

✓ Perceived safety increased after interventions.

✓ Treatment schools reported lower perceived risk.

✓ Results were consistent across:

- Fixed-effect models
- DiD models
- Non-parametric tests
- Factor analysis

✓ Vehicle speeds also decreased at treated schools (-15 km/h and -5 km/h | +9 km/h).

Conclusions

- Composite one-factor score showed consistent results.
- Self-reported survey can detect infrastructure-related safety changes.
- It can be used as a complementary safety indicator where crash data are limited.
- Further validation is needed across settings and age groups.

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